

Bioarchaeology in Southeast Asia and the Pacific: Newsletter

Issue No 9
May 2013

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Welcome to the ninth annual newsletter designed to update you on the latest news in the field of bioarchaeology in Southeast Asia and the Pacific. Please circulate to your colleagues and students and email me if you wish to be added to the email recipient list. In the next few weeks you will also be able to find copies of this and past newsletters at <http://eprints.jcu.edu.au/> and search for “Domett”.

News

AUSTRALIA

From: Judith Littleton
University of Auckland, New Zealand
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Subject: *General News*

Associate Professor Judith Littleton and her students are doing ongoing work with the South Australian Museum and Aboriginal communities around the human remains collections including pulling together a proposal to work on the Roonka collection with the community. They have been writing up some of their analyses of neighbouring groups and generally trying to get work submitted.

INDONESIA

From: Dyah Prastiningtyas¹ & Truman Simanjuntak²
1. Centre for Prehistory and Austronesian Studies; 2. Pusat Arkeologi Nasional & Centre for Prehistory and Austronesian Studies
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Subject: *Prehistoric Burials of Harimau Cave, South Sumatera, Indonesia*

The 2012 research in Padang Bindu, Baturaja, aimed to produce a comprehensive data and report in regards to understanding the prehistoric period of the region. One of the highlights from the 2012 research programme was the excavation held in Harimau Cave, located in the karstic hill of Padang Bindu. It presented a great deal of potentially new data for prehistoric archaeology in South Sumatera. Harimau Cave is situated in the village of Padang Bindu, District of Baturaja, South Sumatera Province and was discovered in 2008 based on a report received by locals who named this cave as Karang Sialang. The 2012 excavation was the 4th season of excavation held at the site since 2008.

Findings presented from excavations vary from stone tools, faunal remains, panels of rock art, and also 66 human burials; it is thought the number of burials will increase in the future as further excavations and research are undertaken. Burial features were first revealed during the excavation of 2010 and further excavation seasons yielded other skeletal remains within a burial context with a total number of 66 exposed individuals in burial context (Fig. 1).



Fig 1.

Views of burial contexts in Gua Harimau
Photos courtesy of D. Prastiningtyas, 2012.

Preliminary analyses were done on the field, using osteoarchaeological methods of age estimation, sex determination, and stature estimation. Macroscopic observation regarding pathological lesions were also noted and catalogued. Current data present 34 adults, 6 infants (including 2 babies) and 7 juveniles, with 17 males and 16 females. Other individuals are unknown due to poor preservation of the bones and absence of skeletal features able to be analysed. Pathological conditions recorded among the skeletal collection included a healed fracture (Fig. 2a), osteoarthritis, and several cases of leprosy-like lesions or possibly the advanced stage of tuberculosis (Fig. 2b).



Fig. 2b

Individual with healed fracture on the right femur.

Photos courtesy of D. Prastiningtyas, 2012.



Fig. 2b

Individual with leprosy-like or advance stage tuberculosis.

Photos courtesy of D. Prastiningtyas,

Most of the burials are oriented in the east-west direction with faces facing north, but there are burials considered to be secondary as they were found in a state of disarticulation from the anatomical position. Current radiocarbon dating done in BATAN (Badan Tenaga Nuklir Nasional) placed these skeletal remains in $\pm 3000-1000$ BP. These are not yet considered to be the final set of data, as it is thought that other burials might still show up as further excavations and research continues.

From: Hallie Buckley
Department of Anatomy, University of Otago, Dunedin, New Zealand
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Associate Professor Hallie Buckley, Dr Sian Halcrow, Dr Rebecca Kinaston and Dr Aimee Foster undertook research at the site of Pain haka, east Flores, Indonesia.

VIETNAM

From: Marc Oxenham
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Subject: *New excavations at Con Co Ngua*

<http://news.anu.edu.au/2013/05/01/clues-to-southeast-asian-civilisation-unearthed/>

MYANMAR

From: A.-S. Coupey, Aung Aung Kyaw, O. Pryce
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Subject: *Evolution of Bronze and Iron Age Cultures of Myanmar: the last excavation in Kan Gyi Gon.*

After twelve years of research directed by Jean-Pierre Pautreau on Iron Age cemeteries in the Samon Valley, for 2013 the Mission Archéologique Française au Myanmar (MAFM) has carried out a new excavation at a site called Kan Gyi Gon, in a region further west towards the Irrawaddy. About 1.5 km north of the current village, the cemetery has a diameter of c. 100 m and slopes c. 1.5 m from one side to the other.

The 2013 research objectives remained centred on the Chronology and Evolution of Bronze and Iron Age Cultures of Myanmar and their Anthropological and Technological Characteristics, with an increased emphasis on economy and industry under MAFM's



new director, Oliver Pryce.

Fifty-three burials were studied within a cemetery much larger in which many tombs had been destroyed by looting. 22 adults, 16 immature and 15 individuals of indeterminate age (skeletal remains being very poor) were recovered. The inhumations were primary with the bodies laid prone on their backs, head towards the east. They were deposited at the same level, rarely superimposed and never inter-cut. The funerary containers were of many types: wooden coffins, shrouds and aligned ceramic jars.

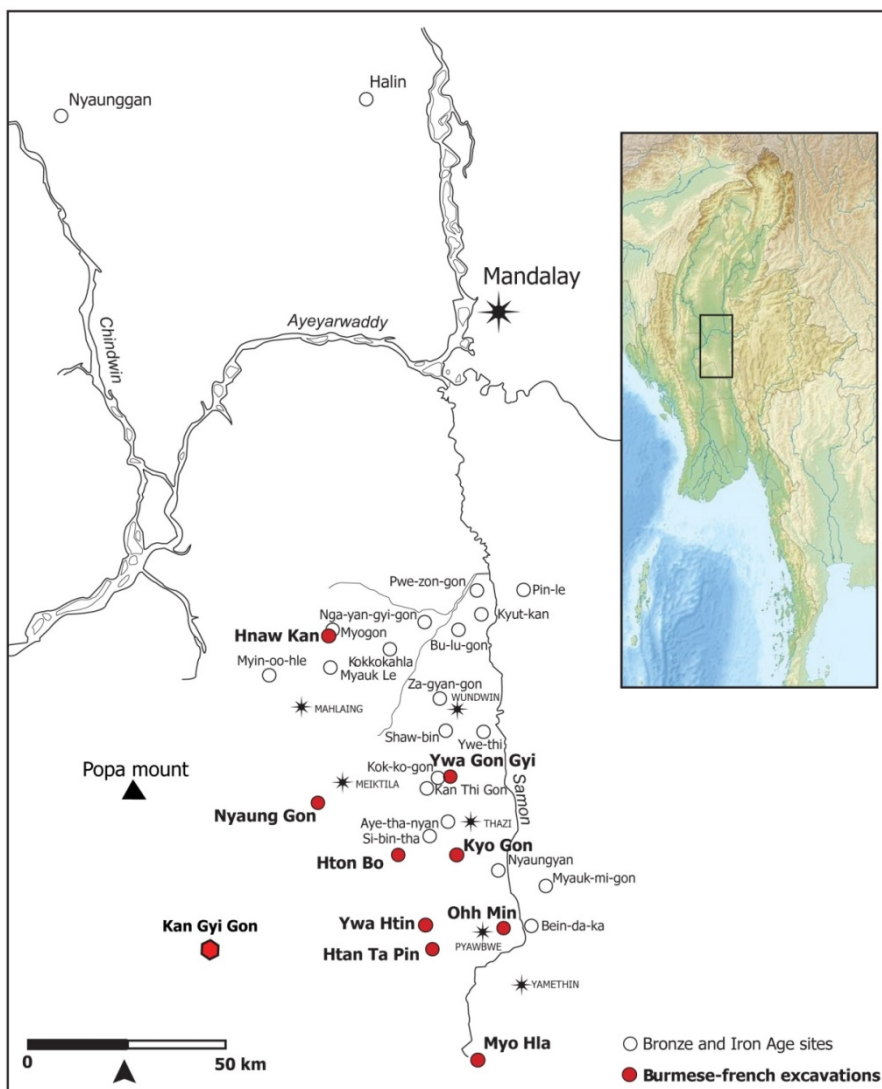


Figure: Map indicating the location Kan Gyi Gon

The fieldwork took place last February 2013 and the ^{14}C dates are not yet available, though it should be noted that six samples have been submitted this year thanks to the archaeobotanical recovery techniques employed by Leilani Lucas (UCL). Nevertheless, the grave goods suggest the inhumations are Iron Age, between the 4th c. BC and 2nd c. AD. Other than a few ceramic forms identified as different from those found in the Samon Valley by Aude Favereau, the most common morphologies and decorations were highly comparable to those previously reported by MAFM: globular and cylindrical jars dishes, beads in green and red glass, shell, carnelian and rock crystal, bundles of copper-base wire, copper-base bells and ferrous tools.

We look forward to reporting more detailed scientific results as they become available.



Figure: Some examples of the Kan Gyi Gon human burials.

THAILAND

From: Charles Higham, Dougald O'Reilly, and Louise Shewan
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Subject: *From Paddy to Pura: the Origins of Angkor – Excavations at Non Ban Jak*

This research initiative is funded by the Australian Research Council in a grant to Dougald O'Reilly and Louise Shewan. It involves excavations at Lovea and Prei Khmeng in Cambodia (see News below) and at Non Ban Jak in Northeast Thailand. Non Ban Jak is a moated site located about 8 km west of Noen U-Loke and Ban Non Wat. The moats and banks have been dated to the 6th century AD. After two seasons of excavations under the direction of Charles Higham and Rachanie Thosarat, we have opened two squares in different parts of the site. In the first and largest, we encountered a succession of buildings comprising clay and laterite wall foundations and clay floors. These overlay two ceramic kilns for firing late Iron Age Phimai Black pottery vessels. These buildings were residences, and in one layer, they were separated by a lane. One chamber measuring 3.8 by 3.8 metres appears to have been a ritual room, containing three burials, one of an adult, a child and an infant. In three of the four corners of this room (the fourth was disturbed), we found lip to lip Phimai Black pottery vessels. In the two earliest buildings, at least one infant had been meticulously interred within pottery vessels in the centre of a room. The intriguing evidence for such ritual burials in the Iron Age has implications for the analysis of contemporary cemeteries, for if infants were selected for such a practice, the demographic data from dedicated cemeteries will be skewed.

The second square revealed a late Iron Age cemetery containing the burials of adults and infants. Mortuary offerings included pig bones, agate and shell pendants, glass beads, ceramic vessels, bronze bangles and rings and bimetallic rings.



Figure: An early building at Non Ban Jak. The arrow points to an infant burial within one of the rooms.

CAMBODIA

From: Dougald O'Reilly, Louise Shewan and Kate Domett
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Subject: *The Paddy to Pura: Origins of Angkor - Excavations at Lovea, Cambodia*

The Paddy to Pura: Origins of Angkor Project is entering its third and final year. In 2013 the team undertook excavations at Phum Lovea, near Angkor and at Non Ban Jak (see above) in Northeast Thailand. Lovea and Non Ban Jak are both moated sites and one of the aims of the project is to examine this type of site in the heartland of Angkor and what was later a peripheral area of Angkorian power. Work at both sites has revealed exciting results including a suite of burials and in Thailand, evidence of domestic occupation and kilns. Kate Domett, Louise Shewan and Dougald O'Reilly headed the excavations in Cambodia while Charles Higham, Rachanie Thosarat and Sian Halcrow lead the work in Thailand. The project also involves Lisa Matasoo Smith, Tom Higham, Oli Pryce, Damian Evans and Rethy Chhem. Associate investigators include; Amphan Kijjingam, Ea Darith, Vouern Vuthy and Alison Carter and a host of volunteers to whom the project is very grateful. Next year will see a return to excavations in Thailand and Cambodia.

The analysis of the human skeletal remains from the 2012 excavations at Lovea has been completed in May last year. The human remains were extremely poorly preserved but we have identified 14 individuals: all adults of which seven were determined to probably be male while the remaining seven are undetermined. A further cranium was identified during the 2013 Lovea excavations completed in January this year (Fig. 1).

Figure 1: Georgia Roberts excavating Burial 12 at Lovea in January 2013. Only the human cranium was able to be excavated with the remainder of the skeleton in the baulk.



The analysis of the Sophy skeletal remains has now also been completed and some aspects have already been published (see Domett et al, in press; Newton et al., 2013). Further research will be included in Jennifer Newton's PhD. Thanks to volunteers Var Inariddh, Georgia Roberts and Christina Alonso for assistance in this analysis of Sophy and Lovea skeletal remains (Fig.2 and 3).



Figure: Christina Alonso helping with analyses of the Lovea and Sophy skeletal remains in May 2012 in Siem Reap.



Figure: Var Inariddh and Georgia Roberts helping with analyses of the Lovea and Sophy skeletal remains in January 2013 in Siem Reap.

References:

- Domett K, Newton J, O'Reilly DJW, Tayles N, Shewan L, and Beavan N. in press. Cultural Modification of the Dentition in Prehistoric Cambodia. *Int J Osteoarchaeol*. DOI: 10.1002/oa.1245.
- Newton J, Domett K, O'Reilly DJW, and Shewan L. 2013. Dental health in Iron Age Cambodia: temporal variations with rice agriculture. *International Journal of Paleopathology* 3:1-10. <http://dx.doi.org/10.1016/j.ijpp.2013.01.003>.

From: Nancy Beavan and Sian Halcrow, Department of Anatomy, Otago School of Medical Science, Dunedin, New Zealand.

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Subject: *"Living in the shadow of Angkor": Responses and strategies of upland social groups to polity demise in the late- to post-Angkor period.*

In October of 2012, Nancy Beavan (Principle Investigator) and Sian Halcrow (Associate Investigator) were awarded a prestigious \$720,000 Marsden Grant from the Royal Society of New Zealand to investigate the Jar and Coffin Burial phenomena of the Cardamom Mountains, Cambodia. The Cardamom Mountain Jar and Coffin mortuary ritual incorporates nautical trade ware ceramic jars, and log coffins fashioned from locally harvested trees as burial containers which were set out on exposed rock ledges at 10 currently known sites which we have geo-located in the eastern Cardamom Massif over the past ten years.

The project focuses on a largely unknown phenomenon; even the basic research outputs are important contributions to regional archaeological research, given the limited prior work on marginal cultures and the present lowland-centred view of the Khmer historical record. The project also encompasses potentially transformative research that creates new knowledge as it addresses questions about demographics, health, the ritual style, the environment, and economic/trade relationships of a people

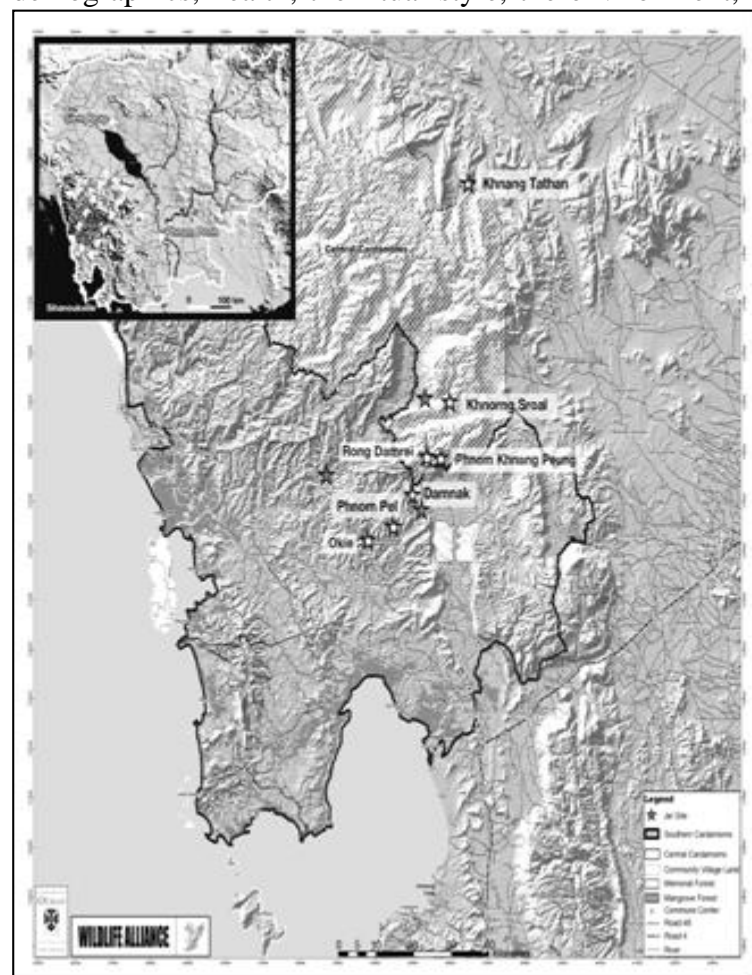
living coincident with, but not incorporated into, the Late Angkorian state. The project aims are:

1. The first overall description of a Late-to Post Angkorian highland culture by assessing:

- a. The variables of demography, diet and health among the mortuary ritual sites

- b. The nature of trade/economic relationships suggested by the use of Maenam Noi and other non-local ceramics, glass beads, and glass and metal rings found among the burials.

2. To assess how the regional precipitation extremes that affected the lowland Angkorian polity (Buckley et. al 2010) were expressed in the massif, and if evidence for precipitation variation in the massif correlates with any variations in demography, health or diet of the Jar and Coffin burial culture. Our scope for the three year Marsden Grant is seven of the ten Jar and Coffin burial sites we have previously geo-located [see map]. The work planned in this project extends our initial radiocarbon dating of four sites (Beavan et. al 2012b) and addresses new



archaeological aspects in the sites *Phnom Pel*, *Khnang Tathan*, *Damnak*, *Khnorng Sroal*, or is a full analyses of sites with only initial surveys (*Rong Damrei*, *Phnom Khnang Peung* and *Okie*.)

While the burial ritual is amazingly consistent over the sites in its use of natural rock ledges for burial receptacles, and the simple rings and glass beads incorporated into each burial, the most intriguing of all aspects is the use of the 50–53-cm-high ceramic jars used for the burials. These are from the Singburi /Maenam Noi kilns along Thailand's **Chao Phraya river**, which were in production as early as the 14th to perhaps the 16th centuries AD (Brown 2004; Shaw 2009:31–2; Grave and Maccheroni 2009:201) and a major part of the maritime trade cargoes of ships plying the Gulf of Thailand from at least the 14th century. Evidence of the types of trade ceramics in these cargoes, and the possible age of a typical ship sailing those waters along the Cambodian coastline, was provided by a tantalising result from the radiocarbon dating of a bamboo cored, lacquered vessel found among the recovered cargo of the Koh S'dech shipwreck. The fairly well-preserved object may have been a betel chew container (Fig 1d). The ¹⁴C result of 475±22 yrs BP (D-AMS 1219-006) provided a calibrated ¹⁴C date range using OxCal 4.2 of 1428-1482AD (Beavan et. al 2012a). The radiocarbon age for the lacquered vessel places it as an object fashioned in the early- to late 15th century AD. The subsequent analysis of the lacquer at the Smithsonian Institution's Freer/Sackler Gallery Department of Conservation & Scientific Research (DCSR) indicates a likely Thai source for the thitsiol resin (Beavan et. al 2012a).



Figure 1. Large and small Maenam Noi storage jars, bottles, and Si Satchanalai plates from the Koh S'dech shipwreck (a) similar to ceramics found in Jar and Coffin burial sites (b,c). Bamboo-core, lacquered vessel, possibly a betel chew box, from the Koh S'dech shipwreck (d).

We first reported in this Newsletter on fieldwork at the *Phnom Pel* jar and coffin burial site near Chi Phat, Koh Kong Province (Issue 6, April 2010:15). That fieldwork was led by Nancy Beavan as an objective within a larger Australian Research Council (ARC) Discovery Grant (DP0984968; 2008/11, D. O'Reilly, PI), with additional dating funded by a University of Sydney Research and Development grant (2007, L. Shewan PI). The first radiocarbon dates from a Jar and Coffin burial site, *Khnorng Sroal*, were commissioned from Nancy Beavan in 2003 by Becker Entertainment, who filmed the documentary subsequently aired on National Geographic's "Riddles of the Dead" segment on the Jar and Coffin Burials.

In addition to data from the *Phnom Pel* and *Khnonrg Sroal* sites, we subsequently accumulated radiocarbon and stable isotope analysis from the sites of *Damnakk* and *Khnanng Tathan*, funded by the University of Otago Performance Based Research Fund, and a private trust.

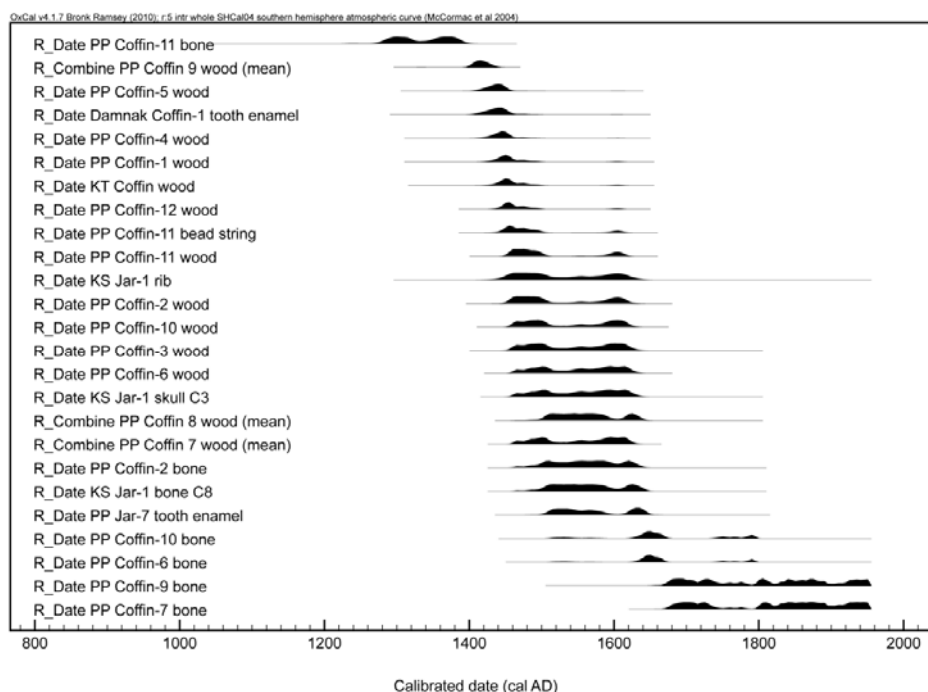


Figure 2 Calibrated CRAs for human bone, tooth enamel, and coffin wood from Phnom Pel (PP), Khnorng Sroal(KS), Damnak Samdech, and Khnanng Tathan (KT) sites. Figure from Beavan et. al 2012b

The suite of 28 radiocarbon ages from the sites *Khnorng Sroal*, *Phnom Pel*, *Damnakk Samdech*, and *Khnanng Tathan* (Fig 2) were published in Beavan et. al (2012b) and provided the first estimation of the overall time depth of the practice. The most reliable calendar date ranges from the sites revealed a highland burial ritual unrelated to lowland Khmer culture which was practiced from cal AD 1395 to 1650. The time period is concurrent with the 15th century decline of Angkor as the capital of the Khmer kingdom and the subsequent shift of power to new Mekong trade ports such as Phnom Penh, Udong, and Lovek. The Jar and Coffin ritual practice, however, has no relationship with any known mortuary practices during pre-Angkorian times or with the typical Hindu/Buddhist cremation rites in the 9th to 15th centuries of the Angkorian era (Beavan et. al 2012b). Like many similar practices of exposed jar and coffin interment elsewhere in Mainland and Island Southeast Asia, the Cardamom Mountain ritual appears to be a highland culture's practice, although its genesis and the identity of the people creating the Cardamom practices is still a mystery. These initial results from our preliminary work at the first four Jar and Coffin burial sites thus provided the first evidence of a highland ethnic minority practice in

the Late- to Post-Angkorian period, and of a people whose lives were contemporary with, yet a world apart, from Angkor.

In January 2012 and January 2013 we undertook fieldwork at the most challenging, as well as the most spectacular, of the Jar and Coffin burial sites. At 600 meters above sea level and so remote that helicopters were required to ferry in food, water and staff for each of the two week missions, the site of *Phnom Khnong Peung* has yielded some of the most intriguing information on this ritual form and burial population.

The *Phnom Khnang Peung* site consists of a 10 meter long, and a maximum 3 meter deep niche in a sheer sandstone outcrop rising above thick forest. We found a total of 40 intact burial jars, and fragments of an additional ten Maenam Noi jars. We are still working on skeletal data collected from our January 2012 and 2013 field work, but we may have an MNI of up to 152 individuals, represented by all age classes and both sexes. Initial radiocarbon dating results from a selection of 30 individuals indicate that the use of the site fits in well with the cal AD 1395 to 1650 range reported for the four sites in Beavan et. al (2012b).



Figure 3 The Phnom Khnang Peung ledge; southwest view into ledge.

Due to the exceptional skeletal preservation at the *Phnom Khnang Peung* site, we have been able to identify two exciting observations in this mortuary population. We believe we have identified the first bioarchaeological evidence of probable scurvy in Southeast Asia in two children (Halcrow et. al, In Press). Our second and most intriguing finding is evidence of dental ablation in seven individuals, exhibited by the bilateral extraction of maxillary lateral incisor and canines, and remodelled alveolar bone. Intentional dental modification in the form of ablation and filing was reported for the first time in Cambodia by Domett et al. (in press) at two late prehistoric sites (Phum Snay and Phum Sophy, c. 2500 to 1500BP), and has been suggested for a number of prehistoric skeletal series from Southeast Asia, such as Northern Vietnam's neolithic through metal periods (Oxenham et al. 2002), and the ablation of maxillary lateral incisors in a prehistoric (4000–3500 years BP) burial site in Thailand (Tayles 1996). However, our calibrated radiocarbon ages for the seven instances of tooth ablation at *Phnom Khnang Peung* range from 1439 AD to 1664 AD, and are compelling evidence for a 15th to 17th century AD use of ablation rituals by people in the southern highlands of Cambodia. Dr Sian Halcrow's manuscript on dental ablation among the Jar and Coffin burial population is in development, and a presentation is planned for the IPPA in Siem Reap in January 2014. Additional presentations to look for at IPPA 2014 are Dr Alison Carter's paper on the bead analysis from the sites, and Mr Tep Sokha's presentation on the ceramics and the extraordinary conservation of same in difficult field conditions.

Field work for 2014 includes dendro-dating and oxygen isotope analysis for climate signals on the coffins and cores from living tree species from which the coffins were constructed. We will also complete analysis on strontium on a wider geographical sampling of the Cardamoms in 2012/13 which provided a more varied range of samples (coffin wood, rock, soil, vegetal and animal material, coffin-source tree species and human skeletal material) versus Sr analysis results on samples taken in 2010, which were limited to one site.



Figure 4. Skeletal material within jars included skulls; Nancy Beavan organising a grid system on the ledge; Sian Halcrow with the skeletal samples; remarkable preservation in the skeletal material.

In sum, the first year of our Marsden-funded project has been an extraordinary success, and full credit for same certainly must be given to our team members who have contributed so significantly to the project: Dr Stacey Ward (biological anthropology), Dr Alison Carter (bead analysis), Mr Tep Sokha and Ms Dany Eam (ceramics analysis and conservation), and Mr Ouck Sokha (Ministry of Culture and Fine Arts, Kingdom of Cambodia).

References

- Beavan N, Tep S, Zoppi U, McCarthy B, Michael S, Cort L, Fraser Lu S. 2012a. Field note: A Radiocarbon Date for the Koh S'dech Shipwreck, Koh Kong Province, Kingdom of Cambodia. Smithsonian Institution, Freer |Sackler "Ceramics in Mainland Southeast Asia" (<http://seasianceramics.asia.si.edu/resources/essay.asp?id=218>)
- Beavan N, Halcrow S, McFadgen B, Hamilton D, Buckley B, Tep S, Shewan L, Ouk S, Fallon S, Miksic J, Armstrong R, O'Reilly D, Domett K, Chhem K R. 2012b. Radiocarbon dates from Jar and Coffin Burials of the Cardamom Mountains reveal a unique mortuary ritual in Cambodia's Late to Post-Angkor period (15th – 17th centuries AD). *Radiocarbon*, 54 (1):1–22 (http://www.academia.edu/1535646/RADIOCARBON_DATES_FROM_JAR_AND_COFFIN_BURIALS_OF_TH)

[E CARDAMOM MOUNTAINS REVEAL A UNIQUE MORTUARY RITUAL IN CAMBODIAS LATE-TO POST-ANGKOR PERIOD 15TH-17TH CENTURIES AD \)](#)

- Brown R. 2004. The Ming Gap and shipwreck ceramics in Southeast Asia [PhD dissertation]. Department of Art History, University of California, Los Angeles.
- Buckley B M, Anchukaitis K J, Penny D, Fletcher R, Cook ER, Masaki Sano, Le Canh Nam, Aroonrut Wichienkeo, TT Minh, T Mai Hong. 2010. Climate as a contributing factor in the demise of Angkor, Cambodia. *PNAS* 107 (15): 6748-6752.
- Domett K, Newton J, O'Reilly DJW, Tayles N, Shewan L, and Beavan N. in press. Cultural Modification of the Dentition in Prehistoric Cambodia. *International Journal of Osteoarchaeology*. DOI: 10.1002/oa/1245.
- Grave P, Maccheroni M. 2009. Characterizing Asian stoneware jar production at the transition to the early Modern period, 1550–1650. In: McCarthy B, Salzman- Chase E, Cort LA, Douglas JG, Jett P, editors. *Scientific Research on Historic Asian Ceramics. Proceedings of the Fourth Forbes Symposium at the Freer Gallery of Art*. London: Archetype Publications. 110 p.
- Halcrow SE, Harris NJ, Beavan N, Buckley H. *In Press*. First bioarchaeological evidence of probable scurvy in Southeast Asia: Multifactorial etiologies of Vitamin C deficiency in a tropical environment. *International Journal of Paleopathology*.
- Oxenham, M.F., L.C. Nguyen and K.T. Nguyen. 2002. Oral health in Northern Vietnam: neolithic through metal periods. *Indo-Pacific Prehistory Association Bulletin*, 22:121-134.
- Tayles N. 1996. Tooth ablation in prehistoric Southeast Asia. *International Journal of Osteoarchaeology*, 6:333-45.

Recent Publications

A reminder about the online bibliography for Southeast Asian archaeology, including bioarchaeology at <http://seasia.museum.upenn.edu/> Click on left image to access. You will need to establish a login, but it is very simple and quick.

- Adler, CJ, W Haak, D Donlon, A Cooper, TG Consortium. 2011. Survival and recovery of DNA from ancient teeth and bones *Journal of Archaeological Science* 38:956-964.
- Cekalovic H, Domett K, and Littleton J. 2012. The History of Paleopathology in Australia. In: Buikstra JE, and Roberts CA, editors. *The History of Palaeopathology: Pioneers and Prospects*. New York: Oxford University Press. p 583-593.
- Cooper, JE and Cooper ME (eds). 2013. *Wildlife Forensic Investigation: Principles and Practice*. CRC Press. ISBN: 978-1-4398-1374-4.
- Demeter F, Shackelford LL, Bacon A-M, Durringer P, Westaway K, Sayavongkhamdy T, Braga J, Sichanthongtip P, Khamdalavong P, Ponche J-L et al. . 2012. Anatomically modern human in Southeast Asia (Laos) by 46 ka. *Proceedings of the National Academy of Sciences* 109(36):14375-14380. 10.1073/pnas.1208104109.
- Demeter F, Shackelford LL, Westaway KE, Durringer P, Sayavongkhamdy T, and Bacon A-M. 2012. Reply to Pierret et al.: Stratigraphic and dating consistency reinforces the status of Tam Pa Ling fossil. *Proceedings of the National Academy of Sciences* 109(51):E3524-E3525. 10.1073/pnas.1217629109.

- Domett K, and Buckley H, R. 2012. Large Lytic Cranial Lesions: a differential diagnosis from Pre-Angkorian Cambodia. *International Journal of Osteoarchaeology* 22:731-739. DOI: 10.1002/oa.1234.
- Halcrow, S. E., Harris, N. J., Tayles, N., Ikehara-Quebral, R., Pietrusewsky, M. 2013 From the mouths of babes: dental caries in infants and children and the intensification of agriculture in mainland Southeast Asia. *American Journal of Physical Anthropology*. 28 JAN 2013, DOI: 10.1002/ajpa.22215
- Halcrow, S. E., N. J. Harris, N. Beavan and H. Buckley (in press for special issue July 2013). First bioarchaeological evidence of probable scurvy in Southeast Asia: Multifactorial etiologies of Vitamin C deficiency in a tropical environment. *International Journal of Paleopathology*.
- Kanthilatha, W.S.P.Y.N., S.G. Yasawardene, Gamini Adikarie, W.E. Boyd and M.M. Pathmalal (2013) Re-visiting the Bellan-bandī Palassa Human Remains of the Mesolithic period, Sri Lanka. *Man and Environment XXXVII* (2): 1-6.
- Kinaston RL, Walter RK, Jacomb C, Brooks E, Tayles N, Halcrow SE, Stirling C, Reid M, Gray AR, Spinks J, Shaw, Ben Fyfe, R. Buckley, H. R. 2013. The First New Zealanders: Patterns of Diet and Mobility Revealed through Isotope Analysis. *PLoS ONE* 8(5):e64580. 10.1371/journal.pone.0064580.
- Kinaston, R., Buckley, HR., Gray, A., Shaw, B., and Mandui, H. 2013. Exploring subsistence and cultural complexes on the south coast of Papua New Guinea using palaeodietary analyses. *Journal of Archaeological Science*. 40: 904-913.
- King CL, Bentley RA, Tayles N, Viðarsdóttir US, Nowell G, and Macpherson CG. 2013. Moving peoples, changing diets: isotopic differences highlight migration and subsistence changes in the Upper Mun River Valley, Thailand. *Journal of Archaeological Science* 40(4):1681-1688.
<http://dx.doi.org/10.1016/j.jas.2012.11.013>.
- Littleton, J., Floyd, B., Dickson, M., Karstens, S., Frohlich, B., Pearlstein, K., & Amgalantögs, T. (2012). Taphonomic analysis of Bronze Age burials in Mongolian khirigsuurs. *Journal of Archaeological Science*, 39 (11), 3361-3370. doi:10.1016/j.jas.2012.06.004
- McKay, S, R. Farah, J. Broadbent, N. Tayles, and S. E Halcrow (in press, publication date 29th May 2013). Is it health or the burial environment: Differentiating between hypomineralised and post-mortem stained enamel in an archaeological context. *PLOS ONE* 8(5): e64580. Doi: 10.1371/journal.pone.0064573.
- Newton J, Domett K, O'Reilly DJW, and Shewan L. 2013. Dental health in Iron Age Cambodia: temporal variations with rice agriculture. *International Journal of Paleopathology* 3:1-10.
<http://dx.doi.org/10.1016/j.ijpp.2013.01.003>.

The dental health of two Cambodian Iron Age (500 BC to 500 AD) communities is interpreted through an analysis of advanced wear, caries, periapical lesions, and antemortem tooth loss (AMTL). The two communities, Phum Snay and Phum Sophy, just 40 km apart, are temporally situated at a time of significant socio-political change prior to the establishment of Angkorian state rule. Dental pathology frequencies are compared between the two communities and with other prehistoric sites throughout

Southeast Asia to determine whether dental health was affected by socio-political changes and the intensification of rice agriculture that also occurred at this time. The people of Snay and Sophy, despite their proximity, were found to exhibit significant differences in dental health. When subdivided by age and sex, Sophy older age class teeth had significantly more advanced wear, and older females had more periapical lesions, while the Phum Snay older age dentitions had significantly more AMTL. Caries rates were similar between the samples. When compared in the broader context of the Iron Age in prehistoric Southeast Asia, both Phum Snay and Phum Sophy suggest a trend of declining dental health during the period prior to the rise of the Angkorian state.

- Pierreta, A., Zeitoun, V., and Hubert Forestier (2012) Irreconcilable differences between stratigraphy and direct dating cast doubts upon the status of Tam Pa Ling fossil. *PNAS* 109 (51): 523. www.pnas.org/cgi/doi/10.1073/pnas.1216774109
- Pietrusewsky M. 2013. Biological connections across the Sea of Japan: a multivariate comparison of ancient and more modern crania from Japan, China, Korea, and Southeast Asia. In: Pechenkina E, Oxenham, MF, editors. *Bioarchaeological Perspectives on Migration and Health in Ancient East Asia*. Gainesville: University of Florida Press. Soon to be released.
- Pietrusewsky M, Douglas MT. 2012. History of Paleopathology in the Pacific. In: Buikstra JE, Roberts, CA, editors. *The Global History of Paleopathology: Pioneers and Prospects*. New York: Oxford University Press. p. 594-615.
- Pietrusewsky, M. 2012. Chapter 146: Biological Distance in Bioarchaeology and Human Osteology. In Smith C. (ed.), *Encyclopedia of Global Archaeology*, DOI 10.1007/978-1-4419-0465-2, ©Springer Science+Business Media, New York.
- Pietrusewsky, M. 2012. Physical Anthropology of the Pacific, in *Physical (Biological) Anthropology*, [Eds. UNESCO-EOLSS Joint Committee], in *Encyclopedia of Life Support Systems (EOLSS)*, Developed under the Auspices of the UNESCO, EOLSS Publishers, Oxford, UK, [http://www.eolss.net] [Retrieved June 29, 2012].
- Robb KF, HR Buckley, M Spriggs and S Bedford. 2012. Cortical Index of three prehistoric human Pacific island samples. *International Journal of Osteoarchaeology*. 22: 284-293.
- Robbins Schug, G., Gray, K., Mushrif-Tripathy, V. and A. R. Sankhyan A Peaceful Realm? Trauma and Social Differentiation at Harappa. *International Journal of Paleopathology* (2012) vol. 2: 136-147.

Thousands of settlements stippled the third millennium B.C. landscape of Pakistan and northwest India. These communities maintained an extensive exchange network that spanned West and South Asia. They shared remarkably consistent symbolic and ideological systems despite a vast territory, including an undeciphered script, standardized weights, measures, sanitation and subsistence systems, and settlement planning. The city of Harappa (3300–1300 B.C.) sits at the center of this Indus River Valley Civilization. The relatively large skeletal collection from Harappa offers an opportunity to examine biocultural aspects of urban life and its decline in South Asian prehistory. This paper compares evidence for cranial trauma among burial populations at Harappa through time to assess the hypothesis that Indus state formation occurred as a peaceful heterarchy. The prevalence and patterning of cranial injuries, combined with striking differences in mortuary treatment and demography among the three burial areas indicate interpersonal violence in Harappan society was structured along lines of gender and community membership. The results support a relationship at Harappa among urbanization, access to resources, social differentiation, and risk of interpersonal violence. Further, the results contradict the dehumanizing, unrealistic myth of the Indus Civilization as an exceptionally peaceful prehistoric urban civilization.

- Robbins Schug G, S Gupta, LW Cowgill, PW Sciulli and S Blatt. (2013) Panel regression formulas for stature and body mass estimation in immature human skeletons, without reference to specific age estimates. *Journal of Archaeological Science* 40 (7):3076-3086.

Anthropologists require methods for accurately estimating stature and body mass from the human skeleton. Age-structured, generalized Least Squares (LS) regression formulas have been developed to predict stature from femoral length and to predict body mass in immature human remains using the width of the distal metaphysis, midshaft femoral geometry (J), and femoral head diameter. This paper tests the hypothesis that panel regression is an appropriate statistical method for regression modeling of longitudinal growth data, with longitudinal and cross-sectional effects on variance. Reference data were derived from the Denver Growth Study; panel regression was used to create one formula for estimating stature (for individuals 0.5 - 11.5 years old); two formulas for estimating body mass from the femur in infants and children (0.5 - 12.5 years old); and one formula for estimating body mass from the femoral head in older subadults (7.5 - 17.5 years old).

The formulas were applied to an independent target sample of cadavers from Franklin County, Ohio and a large sample of immature individuals from diverse global populations. Results indicate panel regression formulas accurately estimate stature and body mass in immature skeletons, without reference to an independent estimate for age at death. Thus, using panel regression formulas to estimate stature and body mass in forensic and archaeological specimens may reduce second stage errors associated with inaccurate age estimates.

- Robbins Schug G, E Brandt and JR Lukacs. (2012) Cementum Annulations, Age Estimation, and Demographic Dynamics in a Mid-Holocene Cemetery, India. *Homo* (2) 63:94-109.

One of the principal problems facing palaeodemography is age estimation in adult skeletons and the centrist tendency that affects many age estimation methods by artificially increasing the proportion of individuals in the 30-45-year age category. Several recent publications have indicated that cementum annulations are significantly correlated with known age of extraction or death. This study addresses the question of how demographic dynamics are altered for an archaeological sample when cementum-based age estimates are used as opposed to those obtained via conventional macroscopic methods. Age pyramids were constructed and demographic profiles were compared for the early Holocene skeletal population from Damdama (India). The results demonstrate that the use of cementum annulations for age estimation in only a subset of the skeletal sample has a significant impact on the demographic profile with regard to specific parameters such as mean age at death and life expectancy at birth.

This confirms the importance of using cementum annulations to refine age estimates in archaeological samples, which, when combined with a fertility-centred approach to demography, can provide new insights into population dynamics in the past.

- Russell SL, Gordon S, Lukacs JR, and Kaste LM. 2013. Sex/Gender Differences in Tooth Loss and Edentulism: Historical perspectives, biological factors and sociologic reasons. *Dental Clinics of North America*. 57(April):317-337. <http://dx.doi.org/10.1016/j.cden.2013.02.006>.
- Zeitoun, V., Prasit Auetrakulvitb, Hubert Forestierc, Antoine Zazzod, Gourgen Davtiane, Supaporn Nakbunlungf, Chaturaporn Tiamtinkritg (2013). *Comptes Rendus Palevol* 12: 127-136. doi:10.1016/j.crpv.2012.09.002
- Zeitoun, V., Hubert Forestier, Heng Sophady, Simon Puaud, Laurence Billault (2012). Direct dating of a Neolithic burial in the Laang Spean cave (Battambang Province, Cambodia): First regional chronological implications. *Comptes Rendus Palevol* 11: 529-537. doi:10.1016/j.crpv.2012.06.006
- Zeitoun, V., De'troit, F., Grimaud-Herve, D., Widiyanto, H. (2010) Solo man in question: Convergent views to split Indonesian *Homo erectus* in two categories. *Quaternary International* 223-224: 281-292. doi:10.1016/j.quaint.2010.01.018

- Zeitoun, V., Arnaud Lenoble, Frédéric Laudet, Jeroen Thompson, William Jack Rink, Jean-Baptiste Mallye, Winayalai Chinnawut (2010). The Cave of the Monk (Ban Fa Suai, Chiang Dao wildlife sanctuary, northern Thailand). *Quaternary International* 220: 160-173. doi:10.1016/j.quaint.2009.11.022

Conference Details

PAPERS PRESENTED AT RECENT CONFERENCES

- **2012 Society for American Archaeologists Annual Meeting**

Memphis, TN, USA April 18th – 22nd, 2012

Abstracts are available from

<http://www.saa.org/AbouttheSociety/AnnualMeeting/Abstracts2012/tabid/1475/Default.aspx>

The following is one of the abstracts presented at the conference:

Early Historic Inhabitants of Vat Komnou, Angkor Borei, Southern Cambodia: A Bioarchaeological Assessment of Health.

Rona Ikehara-Quebral

International Archaeological Research Institute, Inc.

Agricultural intensification, dependence on a few staple crops, and associated cultural and environmental changes are often accompanied by a decline in health (Cohen and Crane-Kramer, 2007). Yet most Southeast Asia groups were relatively healthy compared to other groups undergoing agricultural intensification (Oxenham and Tayles, 2006). In this paper, a biocultural stress model is used to examine the health of ancient inhabitants of Vat Komnou, Angkor Borei (200 B.C. to A.D. 200), during the dynamic period of an emerging social-complexity in Cambodia. Low rates of dental disease, linear enamel hypoplasia, trauma, and infectious disease suggest a relatively healthy group of people.

- **2012 8th International Conference on Rapa Nui and the Pacific**

Santa Rosa, CA, July 8-13, 2012

An abstract of interest from this conference:

Bioarchaeology of the Mariana Islands: prehistoric Chamorro health and lifestyle.

Michael Pietrusewsky, Michele Toomay Douglas, Marilyn K. Swift, Randy A. Harper, Michael A. Fleming.

Previous investigations of health and disease in the Mariana Islands suggested that the prehistoric Chamorro of the smaller islands (Rota, Tinian, and Saipan) experienced higher frequencies of indicators of stress than those living on Guam. Possible reasons for these differences included differences in environment and/or resource availability and the greater impact of natural disasters on smaller islands.

Recent archaeological excavations of additional human skeletons from Tinian and Saipan provide an opportunity to expand these interisland studies of the health and lifestyle of prehistoric Chamorro when compared to skeletons from Guam. The indicators of health investigated include cribra orbitalia (CO), linear enamel hypoplasia (LEH), stature, trauma, infection, and dental disease (AMTL, caries, abscessing, alveolar resorption, calculus, and attrition).

Comparisons between Tinian and Saipan Islands reveal few differences. When the skeletons from Tinian and Saipan are compared to those from Guam, significantly higher frequencies of several indicators suggest more childhood stress and oral-dental disease in the Guam skeletal series. In a majority of indicators, no significant differences were found for the skeletons from any of the Mariana Islands. Unexpectedly, these results suggest that the prehistoric inhabitants of Tinian were subjected to lower stress levels than those living on the larger islands of Saipan and Guam. Cultural habits such as chewing *Areca* (betel) nut and other environmental and cultural differences are examined to explain these differences.

- **2012 Marianas History Conference**

Saipan, June 14-16, 2012

An abstract of interest from this conference:

Health and lifestyle among prehistoric Chamorro from Saipan and the Northern Mariana Islands. (Poster)

Michael Pietrusewsky, Michele Toomay Douglas, Marilyn K. Swift, Randy A. Harper, Michael A. Fleming.

Earlier investigations of health and disease in the Mariana Islands suggested that the prehistoric inhabitants of Saipan and the smaller islands experienced more stress than the prehistoric inhabitants of the larger islands such as Guam. This study examines the health and lifestyle in skeletons from two archaeological sites on Saipan, the Chalan Monsignor Guerreiro Road Project (CGM) and the Beach Road Sewer System (BRSS) sites. Context is provided by comparison with skeletons from earlier excavations on Saipan and other islands in the Marianas archipelago. The indicators of stress investigated include cribra orbitalia (CO), linear enamel hypoplasia (LEH), stature, trauma, infection, and dental diseases (e.g., antemortem tooth loss -AMTL), caries, dental abscess, etc.). With the exception of significantly lower dental caries frequency in the skeletons from the CGM and BRSS sites, the prevalence of these indicators of stress is similar in the skeletal series from Saipan. When compared to the skeletons from Guam, significantly higher frequencies of CO, AMTL, and dental attrition and lower frequencies of dental caries were observed in the Saipan skeletons. Slightly higher, but not significant, frequencies of treponemal infection and limb bone fractures were observed in the Saipan series. The results of this study support, in part, earlier assessments that the prehistoric Chamorro living on Saipan experienced more stress than those living on Guam. The cultural practice of chewing *Areca* (betel) nut and other environmental and cultural differences may help to explain these results.

- **2012 Australasian Society of Human Biology**

Port Vila, Vanuatu 27th November – 1st December 2012

The 26th Annual ASHB conference was held in Port Vila, Vanuatu from the 27th of November-1st December 2012. A number of papers at the conference included bioarchaeology research in Southeast Asia and the Pacific. All abstracts have recently been published in the journal *HOMO: Journal of Comparative* volume 64, issue 2.

<http://www.sciencedirect.com/science/journal/0018442X>

If you do not have institutional access to this journal and would like to see any of the abstracts please email me: kate.domett@jcu.edu.au

The following presentations may be of interest:

- *Differential pathogen loads affecting quality of life during Lapita colonisation of the Pacific: Skeletal pathology in the SAC Watom and Teouma sample.* Buckley H, Kinaston R, Anson D, Bedford S, Spriggs M

- *Description of jar burial practice at the Teouma Lapita cemetery (Efate, Vanuatu) and preliminary comparisons with Southeast Asia jar burial traditions.* Valentin F, Choy J, Kerner J, Spriggs M, Bedford S, Buckley H.
- *Palaeodiet, horticultural transitions and human health during the Lapita and post-Lapita periods on Uripiv island, Northeast Malekula, Vanuatu (3000-2300 BP).* Kinaston R, Buckley H, Bedford S, Hawkins S
- *Were the people of Teouma bone formers?* Foster A, Buckley H, Tayles N, Bedford S, Spriggs M.
- *Subadult stress within the Western Pacific: Frequencies of linear enamel hypoplasia in a skeletal sample from coastal Papua New Guinea.* Roberts G
- *Bioarchaeological analysis of dental health and diet in Tonga.* Stantis C
- *Ban Non Wat: an update on the lives of late prehistoric mainland Southeast Asians.* Tayles N, Halcrow S, King C, Clark A, Foster A, Harris N.
- *The application of digital radiography to bioarchaeological studies of oral health: A case study from Ban Non Wat, Thailand.* Shkrum S, Tayles N, Halcrow S, Foster-Page L
- *Prehistoric diet and dental health at Ban Non Wat, Thailand.* Newton J, Domett K, Chang N, King C, Wurster C.
- *From the mouths of babes: dental caries in infants and children and the intensification of agriculture in mainland Southeast Asia.* Halcrow S, Harris N, Tayles N, Ikehara-Quebral R, Pietrusewsky M.
- *Palaeodietary reconstruction at An Son.* Willis A, Oxenham M.
- *Estimating missing deciles of crown height in human canines.* McFarlane G.
- *Variability in bioarchaeological samples: a query from Australia.* Littleton J, Scott R.
- *The Old Sydney Burial Ground: clues about the health and diet of the first British settlers of Australia.* Donlon D, Lowe T.
- *Dental Modification at Neolithic Man Bac: A Signifier of Social Identity, Group Membership?* Oxenham M, Matsumura H
- *Childhood Stress at Iron Age Nagsabaran – A Study of the Prevalence, Chronology and Duration of Linear Enamel Hypoplasia.* Church E, Oxenham M
- *The life and times of two people from the Bronze Age in northeast Thailand.* Domett K, Colbert A, Chang N
- *Unusual skeletal age variation within an individual in Queensland: A forensic case study.* MacGregor D, Murray K
- *The Use of Non-Human Bone as a Proxy for Human Bone in Time-Since-Death Studies: A Potential Way Forward.* Menzies J, Croker S, Donlon D
- *Development of dentition as a marker for age assessment and its relevance to age estimation of living individuals with no documentation, including archaeological skeletal remains.* Kalpukai M
- *The endosteal region of long bone shafts: a potential area of difference between human and non-human bones.* Croker S, Reed W, Donlon D
- *Finding Australia's Fallen: Investigation and recovery of Australian soldiers from past conflicts.* MacGregor D, Oxenham M, Donlon D, Manns B

• **2013 Society for American Archaeologists Annual Meeting**

Honolulu, Hawaii, USA 3rd - 7th April 2013

Abstracts are available from

<http://www.saa.org/AbouttheSociety/AnnualMeeting/Abstracts2013/tabid/1497/Default.aspx>

This meeting was well attended by both Southeast Asian and Pacific archaeologists and bioarchaeologists. You may be interested in searching on the above webpage for the following abstracts that related to Bioarchaeology in Asia and the Pacific including (but there are more...):

- Siân Halcrow, Nathaniel Harris, and Nancy Tayles—*Endocranial Lesions in Infants and Children from Prehistoric Southeast Asia: Evidence for a Decline in Health with the Intensification of Rice Agriculture*
- Benjamin Valentine and John Krigbaum—*Aridity, Residence, and Resource Use: Stable Isotope Data from Indus Civilization Human Remains*
- Ekaterina Pechenkina and Xiaolin Ma—*The Consequences of the Mid-Holocene Climatic Optimum and Subsequent Cooling for Human Health in China's Central Plains*
- Jo Ann Sakaguchi—*Biological Adaptations to Environmental Stresses in the Minatogawa Fossils from Okinawa, Japan*
- Hallie Buckley, Jean Christophe Galipaud, Truman Simanjuntak, Siân Halcrow, and Rebecca Kinaston—*The possible Influences of Ecology in Island SE Asia and Oceania on Human Health during Austronesian Settlement*
- Judith Littleton, Melinda Allen, Gina MacFarlane, and Hannah Cowie—*Humans and Other Animals: Environmental Change in the Marquesas*
- Rebecca Kinaston, Hallie Buckley, Stuart Bedford, and Stuart Hawkins—*Palaeodiet, Horticultural Transitions and Animal Husbandry during Lapita and Post-Lapita Periods in Vanuatu (3000-2300 B.P.)*
- Colin Pardoe—*Territoriality and Conflict in Aboriginal Australia*
- Karen Kadohiro, Adam Lauer, and Michael Pietrusewsky—*Using Spational Variation Analyses to Test Biological Distance Models in Pacific Populations*
- Adam Lauer, Tianlong Jiao, and Guoping Sun—*Biological Relationships of Neolithic Southeast China*
- Hitoshi Fukase, Masatomi Kudaka, Toshiyuki Tsurumoto, Masaki Fujita, and Hajime Ishida—*Geographic Variation in Skeletal Limb Size and Proportions among Northeast/East Asian Populations*
- Daniel Temple—*Stress Chronology and Periodicity among Late/Final Jomon Period Foragers from Hokkaido*
- Yasushi Shimoda, Hajime Ishida, Minoru Yoneda, Yuichi Naito, and Tomohito Nagaoka—*Reconstruction of Life Activity and Subsistence in People of the Prehistoric Okhotsk Culture, Northern Japan*
- Noboru Adachi, Ken-ichi Shinoda, Kazuo Umetsu, Osamu Kondo, and Yukio Dodo—*Ethnic Derivation of the Hokkaido Ainu Inferred from Mitochondrial DNA data*
- Krystal Hammond and Jennifer Thompson—*Grave Reflections: Changes in Children's Burials at Non Nok Tha, Thailand (ca. 3000-200 B.C.)*

The following are some of the abstracts presented at the conference sent in by colleagues:

Sexual Dimorphism and Environmental Change in Prehistoric Southeast Asia

Clark, A., Tayles, N., and Halcrow, S

Department of Anatomy, School of Medical Sciences, University of Otago, New Zealand

Sexual dimorphism, the size and shape differences between males and females, has been commonly employed as a measure of human biocultural adaptation in skeletal samples. A decrease in sexual dimorphism in skeletal size as a consequence of variation in males is generally associated with major environmental changes, including agricultural intensification. This paper aimed to use long bone lengths (LBL) and epiphyseal dimensions (ED) to quantify the level of sexual dimorphism from a sample of 190 adult human skeletal remains from a single site in Northeast Thailand (1750 – 420 B.C). This sample spans the period of the intensification of agriculture, with associated technological changes, increased trade networks, and changes in social complexity. The results indicate two trends: 1) initially sexual dimorphism decreases in LBL and stasis in ED; 2) followed by, an increase in sexual dimorphism in LBL and ED. Unexpectedly, this investigation has shown that the changes in sexual dimorphism over time were the consequence of greater female variation compared with males. This is interpreted in the context of health indicators in the sample and implications of the results on the general model of sexual dimorphism and health change during the intensification of agriculture are outlined.

The influence of socio-cultural change on osteoarthritis in prehistoric Ban Non Wat, Thailand

K Domett¹, C Evans², N Tayles³, N Chang²

¹*School of Medicine and Dentistry and* ²*School of Arts, Education and Social Science, James Cook University, Townsville, Australia*

³*Department of Anatomy and Structural Biology, University of Otago, New Zealand*

Osteoarthritis is the most ubiquitous joint disease in both modern and ancient skeletal samples. Its multifactorial aetiology and an incomplete understanding of its exact pathogenesis have led to debate around the interpretation of this disorder in prehistoric skeletal collections, particularly with reference to human behaviour and activity. Despite limitations in interpretation, the fact remains that osteoarthritis is frequently observed and can lead to pain, limited mobility and disability. The prehistoric community of Ban Non Wat in northeast Thailand spans over 2000 years from early Neolithic times to late Iron Age. From a biocultural perspective, this temporally continuous sample of skeletal remains provides a rare opportunity to look at the development of health through time within a discrete environment. Overall, the community showed the highest levels of osteoarthritis in the shoulders, elbows, knees and feet with some noticeably consistent patterns through time; however preservation issues have limited statistical analyses. Unilateral degeneration was common suggesting a mechanical influence was dominant over genetics. We will consider how changes in socio-cultural practices, such as subsistence mode, have influenced the prevalence of osteoarthritis and the degree of associated mobility and activity in Ban Non Wat and in the wider context of prehistoric northeast Thailand communities.

Climate Change, Social Suffering, and Collapse: a View from Harappa

Gwen Robbins Schug

In the third millennium B.C., the Indus Civilization flourished in northwest India and Pakistan. The urban period (2600-1900 B.C.) was characterized by long-distance exchange networks, planned urban settlements, sanitation facilities, standardized weights and measures, and a sphere of influence over 1,000,000 square kilometers of territory. Recent reconstructions of the fluvial landscape at the end of the third millennium B.C. demonstrate the Indus Valley was watered primarily by monsoon-fed rivers and that a weakened monsoon system led to increasing hydro-climatic stress at the end of the urban period (circa 2000 B.C.). In this paper, I examine the hypothesis that climate change and socio-economic disruption in the post-urban period at Harappa will be associated with biological consequences--increased levels of conflict, disease, and biocultural stress markers. A comparison of paleoepidemiological statistics for urban and post-urban period burial populations indicates the risk for violence and morbidity increased through time. In addition, rates of violent injury, infection, and 'stress' were uneven among burial

communities in the post-urban period, supporting the claim that climate change and a growing pathology of power were correlated with the collapse of urban life at Harappa.

Biocultural Practices during the Transition to History at Angkor Borei, Cambodia.

Rona Ikehara-Quebral¹, Miriam T. Stark², William Belcher³, Vouen Vuthy⁴, John Krigbaum⁵, Michael Pietrusewsky², and Michele Toomay Douglas²

¹*International Archaeological Research Institute, Inc., Honolulu, USA*

²*Department of Anthropology, University of Hawaii, Honolulu, USA*

³*Central Identification Laboratory, Joint POW/MIA Accounting Command, Pearl Harbor-Hickam, USA*

⁴*Ministry of Culture and Fine Arts, Phnom Penh, Cambodia*

⁵*Department of Anthropology, University of Florida, Gainesville, USA*

Mainland Southeast Asia underwent dramatic changes after the mid-first millennium B.C.E., as its populations embraced new metallurgical and agricultural technologies. Its physical and social environment was further transformed by the emergence of international maritime trade and political reorganization associated with early state formation. To understand the health impacts of this changing environment, we examined an Early Historic period (200 B.C.E. to 200 C.E.) skeletal sample from Vat Komnou, Angkor Borei, in the Mekong delta of southern Cambodia. Degenerative joint disease patterns indicate a distinct sexual division of labor during this period. Intentional dental filing appears to have contributed to poorer oral-dental health. Dental pathologies suggest that the Vat Komnou inhabitants consumed a mixed diet with more fibrous foods and a lower reliance on soft, processed agricultural foods. Isotopic analyses suggest a relatively greater reliance on fish and estuarine dietary resources than on terrestrial protein. We contextualize the Vat Komnou results by comparing them against contemporaneous bioarchaeological data from Cambodia and Southeast Asia, and incorporate findings from recently completed zooarchaeological analyses to study environmental changes at the local and regional scales in the lower Mekong region.

Central Thailand is a vast area with highly diversified geology, waterways, climate patterns, and biota. Toward the later part of Metal Age, the area underwent a gradual process of social complexity increase, as evident by changes of ceramic tradition, mortuary practice, and landscape alteration. Human dietary behavior is a direct indicator of human-environment interaction during this period of cultural change. Stable isotopic ratios from human tooth enamel apatite are used to infer human dietary choices across the landscape and through time. Three central Thai sites are selected for analysis, Ban Mai Chaimongkol, Promptin Tai, and Ban Pong Manao. They are located on terrains with differing characteristics but are somewhat overlapping in chronology, ideal for a regional and temporal assessment of human foodways. When possible, individual life history inferred from isotopic discrepancies between bone and enamel tissues is addressed. Results indicate that people's diet during this period was highly locale-specific. Locally available food recourses largely determined people's dietary choices. This is supported by the biological remains recovered from the sites. Evidence of individual dietary change between earlier and later lifetime is also observed, suggesting change of residency and/or foodways. Causes and scale of people's movement across the landscape warrant further investigation.

Population dietary variability and individual life history of the Metal Age central Thailand.

Chin-hsin Liu and John Krigbaum.

University of Florida

Central Thailand is a vast area with highly diversified geology, waterways, climate patterns, and biota. Toward the later part of Metal Age, the area underwent a gradual process of social complexity increase, as evident by changes of ceramic tradition, mortuary practice, and landscape alteration. Human dietary behavior is a direct indicator of human-environment interaction during this period of cultural change. Stable isotopic ratios from human tooth enamel apatite are used to infer human dietary choices across the landscape and through time. Three central Thai sites are selected for analysis, Ban Mai Chaimongkol, Promptin Tai, and Ban Pong Manao. They are located on terrains with differing characteristics but are somewhat overlapping in chronology, ideal for a regional and temporal assessment of human foodways. When possible, individual life history inferred from isotopic discrepancies between bone and enamel

tissues is addressed. Results indicate that people's diet during this period was highly locale-specific. Locally available food resources largely determined people's dietary choices. This is supported by the biological remains recovered from the sites. Evidence of individual dietary change between earlier and later lifetime is also observed, suggesting change of residency and/or foodways. Causes and scale of people's movement across the landscape warrant further investigation.

Polynesian origins: biodistance studies of crania, mandibles, and some Lapita skeletons.

Michael Pietrusewsky, Hallie Buckley, and Dimitri Anson.

Biological distance studies, especially those based on cranial and skeletal morphology, continue to provide physical anthropologists and bioarchaeologists with an exceptional set of mathematically based methods for understanding population relatedness and population history. Because of the demonstrated correlation between phenotypic and genotypic similarities, studies of cranial form, most notably cranial measurements, occupy a central role in modern biodistance studies. This paper examines the results of multivariate statistical procedures applied to measurements recorded in modern and prehistoric crania and mandibles from the Pacific, including the largest samples of intact Lapita mandibles from the SAC site on Watom Island, New Britain, Papua New Guinea. The analysis of cranial measurements indicates affinities between Polynesian and island Southeast Asia. The analysis of mandibular measurements demonstrates that the Lapita associated mandibles from the SAC site are morphologically most similar to mandibles from eastern Melanesia, and that mandibles from Polynesia are most similar to mandibles from Southeast Asia. While these results do not support any of the previously proposed models for Polynesian origins entirely, the evidence from biodistance studies supports an ancestral Polynesian homeland in Wallacea and not one within geographic Melanesia.

Geographical influences on health in ancient Mariana Islanders.

Michele Toomay Douglas, Michael Pietrusewsky, Marilyn K. Swift, Randy A. Harper, Michael A. Fleming.

Previous investigations of health and lifestyle in the Mariana Islands indicated that the prehistoric inhabitants living on the smaller islands of this archipelago experienced more stress than those living on the larger islands. Differences in environment and/or resource availability and the greater impact of natural disasters on smaller islands were cited as possible reasons for these observed differences. This paper expands on previous research by using one of the largest datasets now available for examining the health of prehistoric skeletons from the Mariana Islands. The indicators of health investigated are cribra orbitalia (CO), linear enamel hypoplasia (LEH), stature, trauma, infection, and dental disease. There is considerable inter-island variability for many of the indicators but generally the highest frequencies of stress are often associated with skeletons from the smaller islands. For several indicators (e.g., stature, limb bone fracture, spondylolysis, alveolar defect) there were no significant differences among islands. These results further suggest that the prehistoric inhabitants of Rota, the smallest island, revealed levels of stress similar to Guam, the largest island. Cultural habits such as chewing areca (betel) nut and other environmental and cultural differences are examined to explain these differences.

• 40th Annual Meeting of the Paleopathology Association

Knoxville, Tennessee, USA 9th - 10th April 2013

The abstracts are available here: <http://www.paleopathology.org/2013MeetingInfo.html>

The following are some of the research presented at the conference sent in by colleagues:

Testing the Relationship between Sexual Dimorphism and Childhood Health in Prehistoric Thailand

Clark, A., Tayles, N., and Halcrow, S

Department of Anatomy, School of Medical Sciences, University of Otago, New Zealand

The level of sexual dimorphism in skeletal dimensions varies between populations and is influenced by genetics and environmental factors. Population sexual dimorphism is often used as a bioarchaeological indicator of health. It is assumed that any change in sexual dimorphism reflects the greater sensitivity of males compared with females, who are commonly thought to be genetically buffered against fluctuations in environmental conditions. Consequently, where sexual dimorphism is low, the conditions for growth and development are interpreted to be adverse. This paper assessed how sexual dimorphism relates to childhood health in a prehistoric adult sample ($n = 190$) from Ban Non Wat, Thailand during the intensification of agriculture (1750 – 420 B.C). Previous bioarchaeological investigations suggest that health in Southeast Asia did not deteriorate as severely compared with some Western populations during this transitional period. Therefore, it is hypothesised that sexual dimorphism will not increase over time. Sexual dimorphism is quantified using long bone lengths and health was assessed from the prevalence of antimeric linear enamel hypoplasia (LEH) as an indicator of non-specific systemic stress during the period of growth in childhood. The prevalence of LEH generally decreased over time at Ban Non Wat, suggesting that conditions for childhood health improved with the intensification of agriculture. However, sexual dimorphism also decreased over time. This diachronic change in sexual dimorphism was the consequence of greater female variation compared with males. Overall, this research provides evidence that assumptions regarding the relationship between health and sexual dimorphism are complex, and regionally variable.

Standardising the diagnosis of dental caries in archaeological remains – A study from prehistoric Southeast Asia.

Shkrum, S.A., Tayles N. and Halcrow, S.E.

• 82nd Annual Meeting of the American Association of Physical Anthropologists

Knoxville, Tennessee, USA, 11th - 13th April 2013

Abstracts are available from <http://physanth.org/annual-meeting/82nd-annual-meeting-2013>

A comparison of visual and radiographic methods for detecting oral pathology in a skeletal sample from Ban Non Wat, Thailand.

Shkrum, S.A., Tayles, N., Halcrow, S.E.

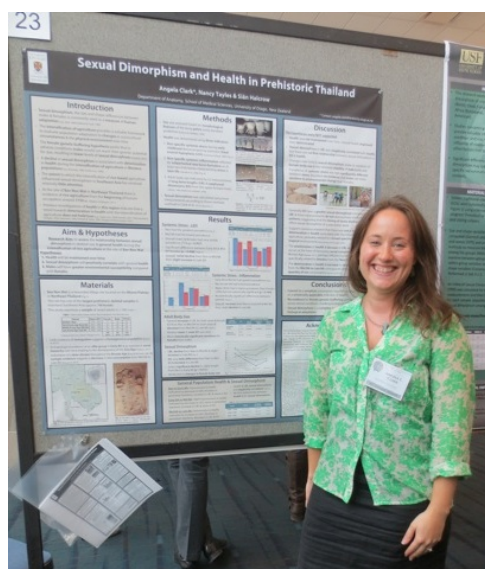
Sexual Dimorphism and Health in Prehistoric Thailand

Clark, A., Tayles, N., and Halcrow, S

Department of Anatomy, School of Medical Sciences, University of Otago, New Zealand

Sexual dimorphism varies between populations and is influenced by environmental factors. The level of skeletal sexual dimorphism in a population is often used as an indicator of health. It is expected that in adverse conditions, males would not reach their genetic potential for size, resulting in low levels of sexual dimorphism. This paper aimed to test the relationship between sexual dimorphism in skeletal size and general health in an adult sample ($N = 190$) from Ban Non Wat, Northeast Thailand (1750–420 B.C). Evidence from previous investigations suggests that health in Southeast Asia did not deteriorate as severely compared with Western populations during agricultural intensification. This research tests three hypotheses: 1) health would be maintained over time; 2) population sexual dimorphism will positively correlate with general health; 3) males will be more sensitive to environmental changes compared with females. These hypotheses are tested by examining childhood stress reflected in the prevalence of linear enamel hypoplasia, terminal adult skeletal size, and stress during later life reflected in periosteal reactions. The results indicated that general health improved over time. However, sexual dimorphism and health were negatively correlated, and females demonstrated greater variation in skeletal dimensions over time, whereas there was stability in male body size. Furthermore, there was a lack of sex-specific differences in either indicators of non-specific systemic stress. This research shows the relationship between changes in health and sexual dimorphism with agricultural intensification in mainland Southeast Asia are complex, and regionally variable.

Angela won the **Earnest Albert Hooton Prize** for the best poster presentation at the 82nd AAPA conference in Knoxville, Tennessee.



• **Australian Archaeological Association (AAA)**
Wollongong, NSW, Australia; 9-13th December 2012
Two sessions on bioarchaeology were included:

1. The science of human remains organized by Jodie Mitchell and Georgia Roberts
jodie.mitchell@alphaarc.com

This session presented the latest research involving the excavation and analysis of human remains, including palaeopathology, within both a national and international context.

2. Forensic archaeology in Australia organized by Royce Richards
rdricha@tmr.qld.gov.au

Examination of forensic archaeology techniques, applications, prospects and future potential in Australia.

Nelum Kanthilatha attended this conference and contributed to the Session: Isotopic and elemental analyses in archaeology and sent in her abstract:

Identification of Past Human Activity by Multi-element Characterization of Sediments at Prehistoric Archaeological Sites in Northeast Thailand

Nelum Kanthilatha¹, William Boyd, Nigel Chang, Jeremy Habberfield-Short

1. PhD Student, Southern Cross University

Email: n.kanthilatha.10@student.scu.edu.au

Archaeological sites of the upper Mun River valley in northeast Thailand represent long-term prehistoric settlement through to around AD 500. This area is characterized by many settlement sites - 3-5m high mounds of several hundred hectares – with distinctive encircling earthworks and channels commonly known as 'moats'. While these sites are known to represent past domestic, industrial and burial activities, details of specific activity is harder to identify from the physical artefacts alone. Soil chemical analysis has the potential to aid interpretation of ancient human activity on such sites. The chemistry of sediments at the two prehistoric sites (Ban Non Wat and Non Hua Ruat) was examined to identify potential indicators of specific anthropological modification of the soils. Sediment samples were analysed by inductively coupled plasma-mass spectrometry (ICP/MS) for Ca, K, Mg, Na, Ag, Al, As, Cd, Cr, Cu, Fe, Mn, Ni, Pb, Se, and Zn. Data is evaluated against a regional soils chemistry data base. Preliminary results show that activity areas in prehistoric sites can be readily be distinguished from natural soils on the basis of chemical residues in anthropologically modified soils. Multi-element characterization by ICP/MS

offers quick and relatively cheap soil analysis to aid archaeological investigation of ancient human activity.

• **2012 14th International Conference of the European Association of Southeast Asian Archaeologists**

<http://www.ucd.ie/archaeology/euraseaa14/>

The EurASEAA14 conference was held in Dublin last year. The conference included a session on Southeast Asian bioarchaeology organized by Damien Huffer. Titles of presentations are listed below, abstracts can be found at <http://www.ucd.ie/archaeology/euraseaa14/sessions.html#Living> or you can click on the following links to go directly to the abstract

- [History in Their Bones: examining mobility in prehistoric Cambodia](#) *Dougald O'Reilly (Australian National University)*
- [In search of the big picture: combining isotopic studies with osteological evidence to study community structure at Ban Non Wat, Thailand](#) *Charlotte L. King (Durham University), R. Alexander Bentley (University of Bristol), Una Strand Viðarsdóttir (Durham University), Nancy Tayles (University of Otago)*
- [Morphological relatedness of *Homo sapiens* groups in Southeast Asia during the late Pleistocene and Holocene: a comparative analysis of human molar shape](#) *Julien Corny (Università di Ferrara), Florent Détroit (Muséum national d'Histoire naturelle)*
- [The cultural and biological context of specimen Song Keplek 5, East Java: implications for living conditions and human-environment interactions during the mid-Holocene](#) *Sofwan Noerwidi (Balai Arkeologi Yogyakarta)*
- [The investigation of palaeohealth and palaeodiet of the Bronze-Iron Age human remains from Blandongan, Batujaya, West Java, Indonesia](#) *Johan Arif (Institute of Technology Bandung), Mark R. Schurr (University of Notre Dame), Noviani Arifina-Istiqomah (Institute of Technology Bandung)*
- [Understanding Filippino human remains through stable isotope analysis](#) *Ame M. Garong (National Museum of the Philippines), Akihiro Kano (Kyushu University), Hiroko Koike (Kyushu University)*
- [The distribution of molluscs, with special reference to *Unionidae* \(freshwater mussels\), in mainland Southeast Asian mortuary contexts](#) *Kenneth Ross (Australian National University), Marc Oxenham (Australian National University)*
- ["Tooth blackening" at the Early Iron Age sites of Prohear \(Cambodia\) and Go O Chua \(Vietnam\)](#) *Simone Kraus (University of Freiburg), Michael Francken (University of Tübingen), Andreas Reinecke (German Archaeological Institute, Commission for Archaeology of Non-European Cultures)*
- [Bioarchaeology of the late prehistoric human skeletons from Ban Non Kho in northeast Thailand](#) *Korakot Boonlop (Silpakorn University)*
- [The road less travelled: a biomechanical investigation of activity and mobility patterns during the northern Vietnamese mid-Holocene](#) *Damien Huffer (Australian National University), Ha Anh Tuan (Institute of Archaeology Hanoi), Truong Hu'u Nghia (Institute of Archaeology Hanoi)*

UPCOMING CONFERENCES AND EVENTS

- ***Third Southeast Asian Bioarchaeology Conference***

From: Associate Professor Nancy Tayles
University of Otago, Dunedin, New Zealand

Email: nancy.tayles@anatomy.otago.ac.nz

We had hoped to hold this conference in Vientiane, Laos in December 2013 but issues with funding mean it will be delayed until 2014. We will advise as soon as more details are available, and we hope to see you all there.

- ***IUAES (International Union of Anthropological and Ethnological Sciences) Congress 2013***

Manchester, UK August 5th to 10th 2013

<http://www.iuaes2013.org/index.html>

This congress will include a session “The vulnerable child: biological responses to life in the past” organised by Sian Halcrow and Mary Lewis.

- ***Annual Meeting of the Paleopathology Association 2013***

The South American Paleopathology meeting will be held this year in Santa Marta, Columbia from the 14th to the 16th August, 2013. More information is available here:

<http://www.paleopathology.org/PAMinSA2013.html>

- ***Chester Conference on Forensics: Wildlife Crime and Conservation,***
21st/22nd June at the University of Derby, UK. crime.wildlife@gmail.com

- ***Australasian Society of Human Biology 27th Annual Meeting 2013***

This year, ASHB will be held at the Women's College on the main campus of the University of Sydney, from the evening of 8 December through to 12 December, 2013. If you would like to receive more information about the conference, please email Sarah Croker at scrocker@anatomy.usyd.edu.au
The conference flyer is included at the end of this newsletter and more information will be posted at <http://school.anhb.uwa.edu.au/ashb/>

- ***Australian Archaeological Association (AAA) 2013***

This year the AAA will be held in Coff's Harbour, NSW, Australia from the 1st to the 4th December, 2013. Details for interested participants can be found at

<http://www.australianarchaeology.com/conferences/aaa2013-conference/>

- ***IPPA Indo-Pacific Prehistory Association Meeting 2014***

Siem Reap, Cambodia Sunday 12 to Saturday 18 January 2014

<http://ippa.weblogs.anu.edu.au/>

The draft session list includes a selection of **sessions** that may include bioarchaeological research:

- *Pleistocene environments of mainland SE Asia: anthropology, paleontology and chronology.* Fabrice DEMETER and Anne-marie BACON demeter@mnhn.fr
- *Human dispersal and diversity in Asia and Oceania: archaeology, skeletal remains and genetics.* Hirofumi MATSUMURA hiromura@sapmed.ac.jp

- *Bioarchaeological advances in mainland and island SE Asia and the Pacific.* Marc OXENHAM and Hallie BUCKLEY marc.oxenham@anu.edu.au
- *Palaeopathology in Asia.* SHIN Dong Hoon drdoogi2@naver.com
- *Present and ancient genetic relationships between Island Southeast Asians and the Taiwanese.* Marie LIN marilin@ms2.mmh.org.tw
- *Paleoanthropology of southern Asia: from the Indian Subcontinent to Australasia.* Parth CHAUHAN parth73@gmail.com
- *What recent archaeological, anthropological, historical and linguistic data tell us about the role of Southeast Asian populations in Indian Ocean maritime transfers.* Bérénice BELLINAPRYCE and Roger BLENCH berenice.bellinapryce@gmail.com

- ***Society for American Archaeology 79th Annual Meeting 2014***

Austin, Texas

April 23-27, 2014

<http://www.saa.org/AbouttheSociety/AnnualMeeting/tabid/138/Default.aspx>

Graduate Student Projects

PROJECTS

- Auckland University, Judith Littleton

Currently Rachel Scott is writing up her PhD on dental microwear and stress indicators from Egypt while Gina MacFarlane is doing her first round of fieldwork at the Museum of London. Ashleigh McGarry is undertaking an MA project analysing cremated remains using both a modern as well as three ancient samples. Lexi Burrows is studying dental microwear and deciduous teeth for her honours thesis.

HONOURS PROJECTS

- Samantha Rowbotham
Australian National University

The Person in the Bones: Osteobiographical analyses of Life in the Iron Age Northwest Cambodia

An osteobiography, recreating the life history of an individual from their archaeologically-derived skeletal remains, is an emerging area of interest in bioarchaeology. This approach, an alternative to the traditional demographic studies, was undertaken on three skeletons from the Iron Age village (100AD-700AD) of Phum Sophy in Northwest Cambodia. The intention of this thesis was to understand who these ‘ordinary’ individuals were as people, and subsequently, what they can reveal about prehistoric life within the broader region prior to the development of complex society.

Each osteobiography analysis was comprised of: skeletal preservation, biological profile (biological sex, age-at-death, ancestry and stature), unique skeletal characteristics (dental pathologies and modifications, degenerative joint disease, enthesal attachments, handedness, and trauma and disease pathologies) and the associated mortuary context.

Interpretations of this skeletal and mortuary data provided reconstructions of the lives of the three individuals. This allowed a deeper understanding of the human condition as it revealed a glimpse into who these bones once were as people and how they lived their lives; the essence of bioarchaeology. These analyses also revealed, on a regional scale, evidence of various activities and lifestyle practices the Phum Sophy community, to some extent, was involved with prior to the development of the great Southeast Asian Empire, Angkor. These lifestyle components are comprised of: hunting, social hierarchies, warfare, cultural practices, diets, sexual divisions of labour, trade and good health.

Supervisors: Dr Dougald O'Reilly (ANU) and Dr Kate Domett (James Cook University)

MASTERS PROJECTS

Those underway...

- Jennifer Menzies
Department of Anatomy and Histology, University of Sydney

Estimation of the Post-mortem Interval for Skeletonized Human Remains in an Australian Cool Climate Environment: Belanglo State Forest and Macropus giganteus in a Representative Case Study.

Establishing the post-mortem interval for human skeletal remains can assist in a forensic capacity to identify a deceased individual by eliminating possible candidates known to have become missing or deceased outside the established post-mortem interval. In Australia, estimating the length of time skeletonized remains have been in the location where they are found is generally very difficult and range estimations can represent a period of many years. The major reason for this is the great variability found in environmental factors. Climate, temperature, fluvial activity, soil composition and floral and faunal invasion all affect the physical and chemical decomposition rate of a skeleton once soft tissue decomposition has occurred. In order to properly assess post-mortem intervals there is a pressing need for local environmental factors to be thoroughly understood where skeletal remains are found. My research may help with solving long-term missing persons cases.

Supervisor: Dr Denise Donlon. Associate Supervisors: Dr Sarah Croker, Dr Melanie Fillios

DOCTORAL PROJECTS

Those underway...

- Stephanie Shkrum
Department of Anatomy, University of Otago, Dunedin, New Zealand

The aim of the thesis is to investigate the oral health of adults (n=244) from the prehistoric site of Ban Non Wat in the Mun River Valley in northeast Thailand, which was continually occupied from the Neolithic to the Iron Age (1750BC to 400AD) and spans the early adoption of agriculture through to its intensification. Because of the long occupational period at Ban Non Wat, this represents a unique opportunity in Southeast Asia to assess the relationship between oral health and subsistence change within a single site. Specifically, this project has two principal objectives: (1) to assess whether there are any diachronic trends in oral health; and, (2) to determine if there are sex differences in oral health and if this changes over time. Oral health is assessed based on several dental pathologies that are sensitive to diet: antemortem tooth loss, dental caries, periapical lesions, periodontal disease and calculus, dental wear, malocclusions and variables relating to jaw robusticity and size. The study also combines bioarchaeological and clinical methods for assessing oral health, including both visual and radiographic examinations. Recently, results have been presented at several international conferences (e.g. ASHB, 2012; APPA and North American PPA, 2013) and the thesis will be submitted before the end of this year.

Supervisors: Associate Professor Nancy Tayles and Dr. Siân Halcrow

Those completed...

- Chin-hsin Liu
University of Florida, Gainesville, USA

Human skeletal health and dietary assessment of Metal Age central Thailand: The impact of changing social complexity and regional variation.

Reflected in mortuary context, increasing social stratification and complexity are indicators of major sociocultural changes for a prehistoric community. Human lifeways, general well-beings and diet in particular, is often directly impacted by these social processes. Central Thailand was an area with vast ecological and cultural diversity in prehistory which subsequently became the epicenter of a prosperous state and cultural entity of Dvaravati in early historical period. During the course of Metal Age, archaeological evidence suggests that this area underwent gradual but significant social and subsistence changes due to increased regional interaction, integration, and adoption of newly introduced cultigens.

Using paleopathological and light stable isotopic ratio analyses, this study aims to delineate the impact of social complexity change on human skeletal health and dietary change through time on intra- and inter-site levels. Based on the assumption that people occupying different social strata having different access/preference to resources and practicing varied tasks, it is hypothesized that as social complexity increased (evident in mortuary variability), the variation of human skeletal health and dietary composition also increased. In addition, this study reconstructs central Thai people's health life history and dietary pattern on a site level to be used in cross-regional comparison. Human and faunal skeletal remains from central Thai archaeological sites are incorporated.

The results indicate that no detectable health and dietary changes were associated with social status differentiation during Metal Age in central Thailand. The lack of biological impact from social change is interpreted as either social status expressed in burial did not entail differentiation of resource access and daily tasks in life or the inherent ecological variability within the region facilitated a tradition of highly inert and locale-specific human biology that endured the impact of social structure change through time. Previous archaeological, cultural, and biological research of Mainland Southeast Asia appears to support the latter interpretation. This study provides a large scale regional synthesis on the interaction among social, ecological,

and human biological aspects of Metal Age central Thailand that is beneficial for the further understanding of human lifeways and sociocultural change in a larger Southeast and East Asian context.

Dissertation committee members: John Krigbaum (Chair), Michael Warren, James Davidson, Guo-long Lai (external member, Art History)

- Damien Huffer
Australian National University, Canberra, ACT, Australia

The Ties that Bind: Population Dynamics, Mobility, and Kinship during the mid-Holocene in Northern Vietnam.

During the mid-Holocene in Northern Vietnam, domestic rice, dogs, and pigs were introduced into Southeast Asia by populations genetically derived from Central China who interbred and traded with indigenous populations. Mortuary practices also changed substantially, indirectly suggesting a change in social structure and migration between communities, as well as possible changes to activity and mobility patterns. To investigate how the adoption of agriculture and increased long distance exchange affected daily life at individual and community levels, this thesis utilizes the skeletal assemblages from Man Bac (c. 3,800BP) and Con Co Ngua (c. 5,600BP). They represent the largest and best preserved mid-Holocene samples from Northern Vietnam, and have been analysed elsewhere to investigate broader topics such as the population history of Southeast Asia, palaeohealth and dietary change during the purported Neolithic Demographic Transition.

To comprehend how daily life changed during this poorly understood time period, three aims, with associated hypotheses, were proposed: 1) To assess overall population mobility during the northern Vietnamese Neolithic transition over individual lifetime and diachronically by comparing strontium isotopic, musculo-skeletal stress marker (enthesis) and cross-sectional geometric data between individuals, sexes and samples; 2) To assess what relationship, if any, existed between social identity as reflected in burial treatment by kin at death, genetic kinship itself, and activity patterns; and 3) To answer questions of community-level social organization, the special treatment in death of first-generation migrants, and sex-based differences in activity/mobility patterns within one community; Man Bac. Social structure was approached through genetic kinship analysis assessed using cranial and dental nonmetric traits. Individual migration histories were approached through strontium isotopic analysis, as well as preliminary assessment of isotopic variation across the landscape. Mobility and activity patterns were assessed via standardized musculo-skeletal stress marker analysis, as well as external and medullary long bone cross-sectional geometry. The cross-sectional geometry research also involved creation of a new method to more accurately assess medullary contours without using CT Scanning.

Results suggest that the introduction of agriculture, as well as genetic heterogeneity in the case of Man Bac, did not result in a markedly different kinship structure, with both cemeteries containing small, unsegregated kin groups. Preliminary isotopic data indicates that first-generation migrants were present in both communities, but only males migrated into Man Bac, most of whom received high-status burials with exotic grave goods, and some of whom are suggested to have fathered locally born descendants. Diachronic comparison of the biomechanical data suggests minimal changes to type or intensity of activity or terrestrial mobility, suggesting that continued broad spectrum hunting and gathering (and hypothesized water-craft usage) outweighed the contribution of agricultural activities. Intra-community

biomechanical analysis suggested different activity patterns for males and females in both populations. Although all results presented are preliminary, this research adds much to our current understanding of daily life during the agricultural transition in Southeast Asia. Beyond that, it demonstrates that significant insights into ancient social identity and community life can be gained by combining and comparing different strands of bioarchaeological data.

Supervisor: Associate Professor Marc Oxenham, Professor Peter Bellwood, Dr John McClelland

- Charlotte King
University of Durham, UK

Charlotte will graduate in June this year in the UK.

Social Organisation and the Rise of Civilisation in the Mun River Valley, Thailand

As one of the most extensively excavated and archaeologically interesting areas of Thailand, the Upper Mun River valley is central to archaeologists' interpretations of Southeast Asian prehistory. In this area there is a demonstrable growth in social complexity from egalitarian first occupation to eventual annexation by the state society of Angkor in the mid first millennium AD. The exact nature of social evolution, however, is still not fully understood. Debate rages over the factors upon which social stratification was based. Do discrepancies in mortuary wealth reflect the presence of a strict, kinship-based hierarchy or a flexible heterarchy? We are also not fully aware of how the agricultural transition took place, whether it was the swift 'revolution' we see in Neolithic Europe, or a slow and gradual uptake of new subsistence strategies. In this thesis isotopic studies are combined with osteological indicators of kinship and population affinity to shed light on these and other archaeological problems which remain unanswered in the Upper Mun River Valley. Isotopic analysis has allowed the identification of migrants in the cemetery of Ban Non Wat, and shown changes in subsistence strategy through time relating to the onset of social inequality and climate change. Analysis of cranial shape has shown that migrant individuals have similar genetic backgrounds to local people, but with the notable exception of one of the only adult jar burials at the site. The combination of dental non-metric techniques, isotopic analysis and cranial shape analysis has also added evidence to the debates over the presence of hunter-gatherers at the site, and the nature of social organization.

Supervisors: Dr. Una Strand Viðarsdóttir, Dr. R.Alexander Bentley and Dr. Nancy Tayles

- Angela Clark
Department of Anatomy, University of Otago, Dunedin, New Zealand

Angela will graduate this month in NZ.

Human Sexual Dimorphism and Health during the Intensification of Agriculture in Prehistoric Thailand

The introduction and intensification of agriculture is regarded as a major transition experienced by humans. This period in prehistory provides a suitable framework to evaluate adaptation of the past populations to changes in the physical and cultural environments over time. This thesis aims to address an aspect of this issue by a temporal investigation of whether there is a relationship between sexual dimorphism in skeletal size and general health from a sample of 190 adult human skeletal remains from a single site, Ban Non Wat, in Northeast Thailand. This

site was chosen as the skeletal sample spans from approximately 1750 *B.C* to 420 *B.C*, during the intensification of agriculture.

Central to this thesis is the investigation of sexual dimorphism, the size and shape differences between males and females, which has been commonly employed as a measure of human biocultural adaptation. A decline in population sexual dimorphism and a decline in general health is generally associated with a shift to intensified subsistence practices in Western populations, where the nutritional quality of the diet decreased over time. This positive correlation is assumed to be the result of males being more sensitive to adverse environmental conditions. Although the extent to which the intensification of rice-based agriculture influenced the level of sexual dimorphism in Southeast Asia has received little attention, previous investigations of health of late prehistoric populations in mainland Southeast Asia do not fit this model of a decline in health.

This research tests three hypotheses, that: 1) health would be maintained over time; 2) sexual dimorphism in body size will positively correlate with general health; 3) males will be more sensitive to environmental changes compared with females. General health was investigated through the analysis of three indicators: long bone lengths and epiphyseal dimensions; non-specific systemic stress during childhood reflected in linear enamel hypoplasia; and non-specific systemic inflammation characterising stress later in life reflected in subperiosteal new bone formation.

The results of this research do not support the first hypothesis as general health improved from the Neolithic to the Middle Bronze Age although it deteriorated from the Middle to Late Bronze Age. Sexual dimorphism in body size decreases and then increases over time, indicating a negative correlation with general health; therefore, the second hypothesis is not supported. The results demonstrate that females show greater variation in skeletal dimensions over time, whereas there is stability in male body size. Furthermore, there is a lack of sex-specific differences in either indicator of non-specific systemic stress. Therefore, the third hypothesis is also not supported.

Overall, these findings support previous research that indicates that the general health and quality of life of the prehistoric people in mainland Southeast Asia did not deteriorate from the Neolithic to Middle Bronze Age and therefore, do not fit the model of a decline in health. This may be a result of a nutritious rice-based diet, supplemented by a diverse range of foods from hunting, fishing and foraging wild plants and animals. The slight deterioration in health from the Middle to Late Bronze Age may be related to climate changes, which necessitated the extensive modification of the physical environment and management of the waterways in the subsequent Iron Age, leading to an increase in infectious diseases, and/or a decline in availability of a nutritious diet. Although these results have shown a relationship between sexual dimorphism and general health, there is no evidence that they are positively correlated, as it is the females that are changing, not the males. This thesis demonstrated that the assumptions regarding the relationship between changes in health and sexual dimorphism with agricultural intensification are complex, and regionally variable.

Supervisors: Associate Professor Nancy Tayles and Dr Siân Halcrow



Australasian Society for Human Biology

27th Annual Conference, 8th to 11th December 2013
Sydney, Australia

***Understanding humans and other primates
in a changing world***

The Australasian Society for Human Biology's annual conference welcomes oral and poster presentations concerning a wide range of subjects linked to human biology, including anthropology (physical, forensic and social), medicine, evolutionary biology, primatology, archaeology, and comparative anatomy. Student presenters are welcomed and encouraged.

This year's conference will be held at The University of Sydney, at The Women's College on the main campus.

Accommodation will be available on site at the college, or there are alternative choices close by. The main campus is also well served by buses from the city.



Great Hall, University of Sydney.

Conference timetable

Sunday 8th December

Monday 9th December

Tuesday 10th December

Evening: Welcome drinks

Conference sessions, followed by AGM

Conference sessions morning and after lunch

Afternoon: Short tour of University of Sydney

anatomical and biological museums

Evening: Conference dinner

Conference sessions

Wednesday 11th December

Abstracts

A call for abstracts will be issued shortly, for submission in September. Registration information will also be available soon.

Questions

For any queries or to be added to the conference mailing list, please contact Sarah Croker (scroker@anatomy.usyd.edu.au), on behalf of the Conference Organising Committee.

ASHB website <http://school.anhb.uwa.edu.au/ashb/>